

Driver Alcohol Detection System for Safety DADSS

REACHING ZERO
Actions to Eliminate Substance-Impaired Driving

National Transportation Safety Board Forum

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QinetiQ North America

Cooperative Agreement

- ◆ Cooperative Agreement between Automotive Coalition for Traffic Safety and NHTSA (begun February 2008)
- ◆ Five-year program to develop and test prototypes that may be considered for vehicle integration
 - Non-invasive, seamless technologies to measure driver BAC and reduce incidence of drunk driving
 - Measure alcohol accurately, precisely, and reliably in a very short time so the sober driver is not inconvenienced
 - Devices intended to prevent alcohol-impaired drivers ($BAC \geq 0.08$) from driving their vehicles
- ◆ **Supports a non-regulatory, market-based approach to preventing drunk driving**
- ◆ Phased approach
 - Phase I – Proof-of-principle prototype development
 - Phase II – Subsystem development and integration into research vehicle

Participating Manufacturers

BMW Group



PORSCHE



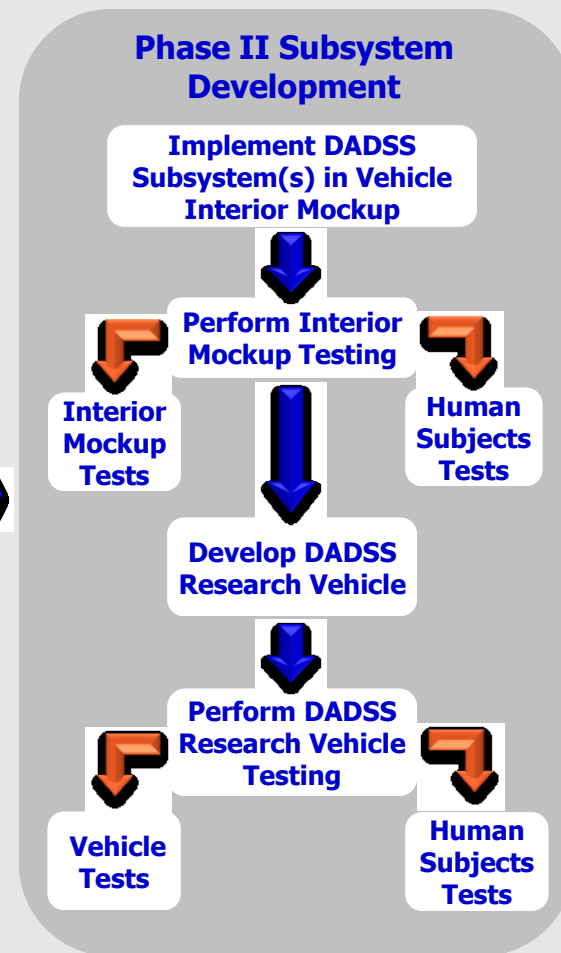
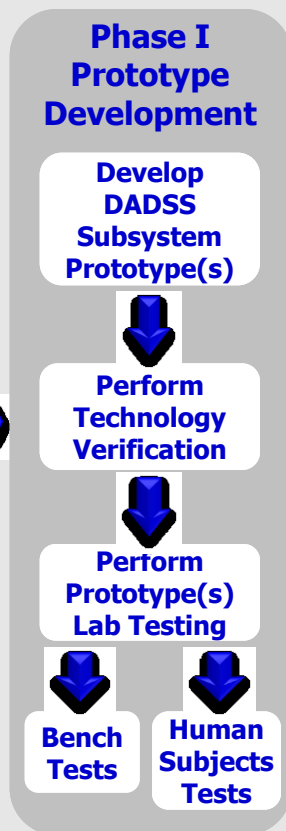
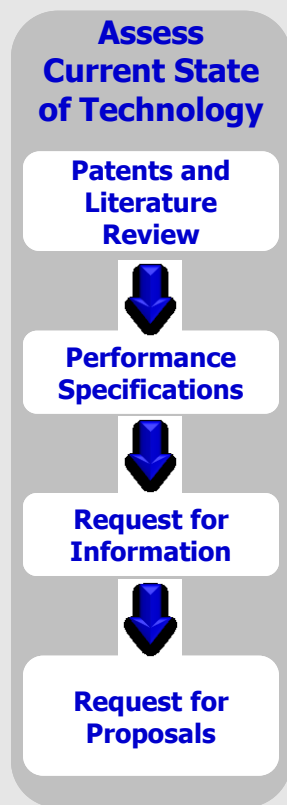
DADSS Program Process

2008

2009

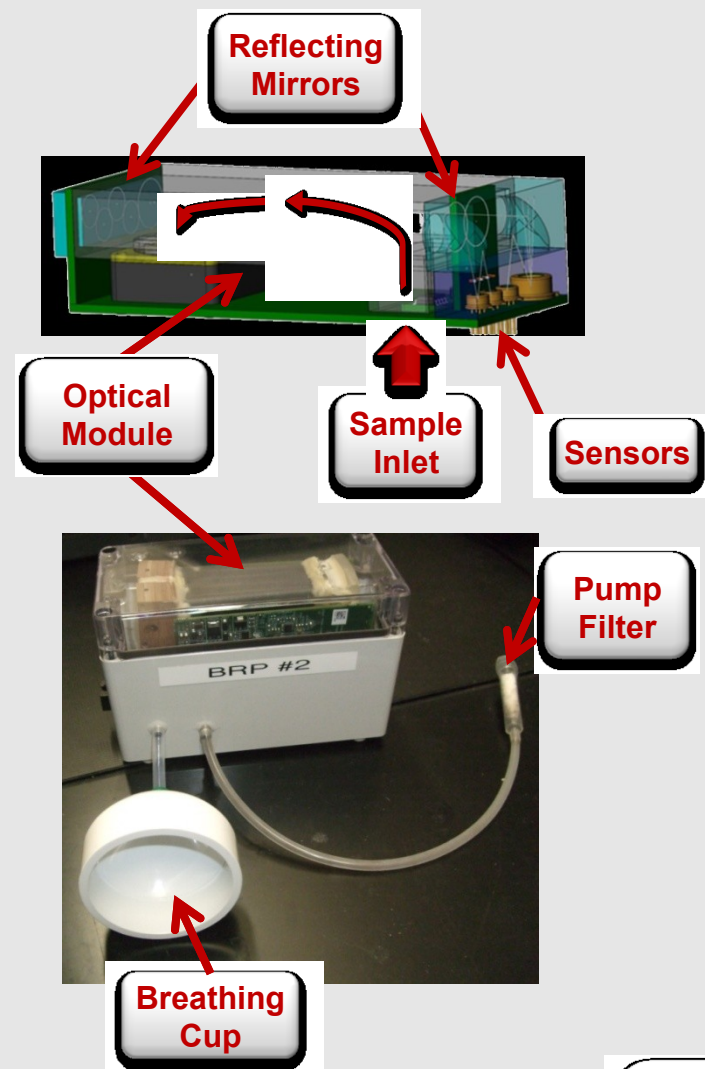
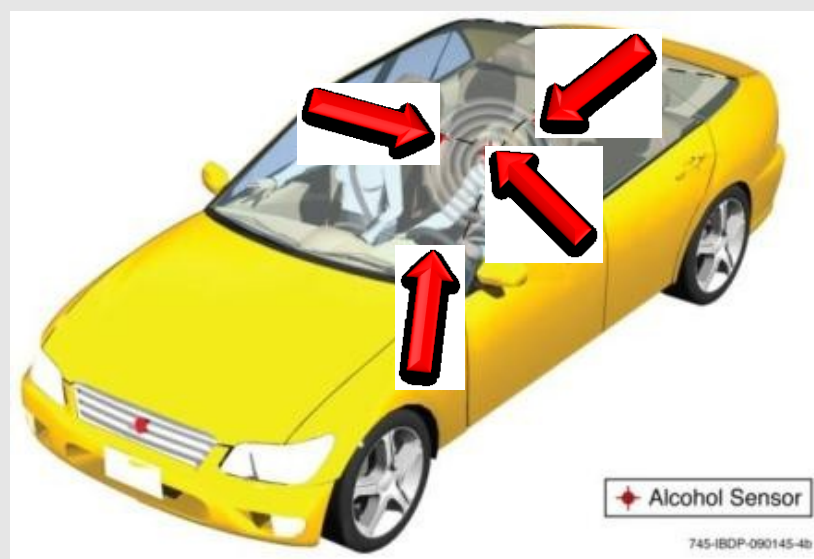
2010

2013



Autoliv Breath-Based Technology

- ◆ Breath-based system
- ◆ Extensive real world experience with breath to measure BrAC
- ◆ Alcohol and carbon dioxide measured by IR sensor
- ◆ CO₂ measures breath dilution

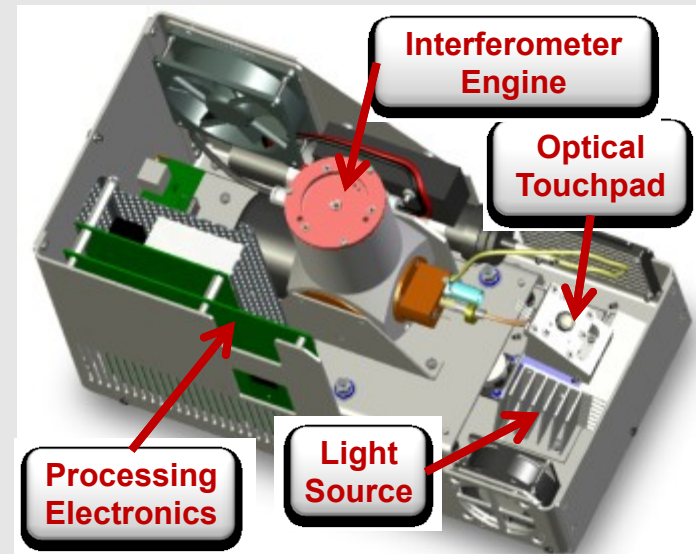


Takata-TruTouch Touch-Based Technology



Concept of Operation

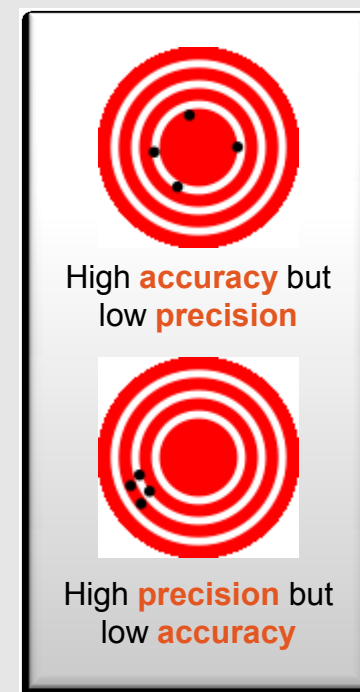
- ◆ Finger placed on touchpad interface
- ◆ Known near-IR light introduced into finger
- ◆ Absorbed (returned) light measured
- ◆ Interferometer measures light intensity at each wavelength
- ◆ Alcohol concentration derived and displayed



DADSS Phase I Requirements

- ◆ Phase I Prototypes evaluated against the following performance specifications:
 - Measure from 0.01% to 0.12% BAC
 - Measurement time = 325 milliseconds
 - Accuracy and Precision
 - 0.07%-0.09% BAC → ±0.0003% BAC
 - Required Standard Calibration Devices (SCD)
 - Breath-based systems
 - Touch-based systems

| % BAC | DADSS Accuracy | 58 FR 48705 §4.1 | DADSS Precision | 58 FR 48705 §4.1 |
|--------------------|-------------------|---------------------|--------------------|---------------------|
| 0.010 - 0.050 | 0.0010 | 0.0050 | 0.0010 | 0.0042 |
| 0.050 - 0.070 | 0.0007 | 0.0050 | 0.0007 | 0.0042 |
| 0.070 - 0.090 | 0.0003 | 0.0050 | 0.0003 | 0.0042 |
| Greater than 0.090 | 0.0010 | 0.0050 | 0.0010 | 0.0042 |



More accurate calibration source required for DADSS program

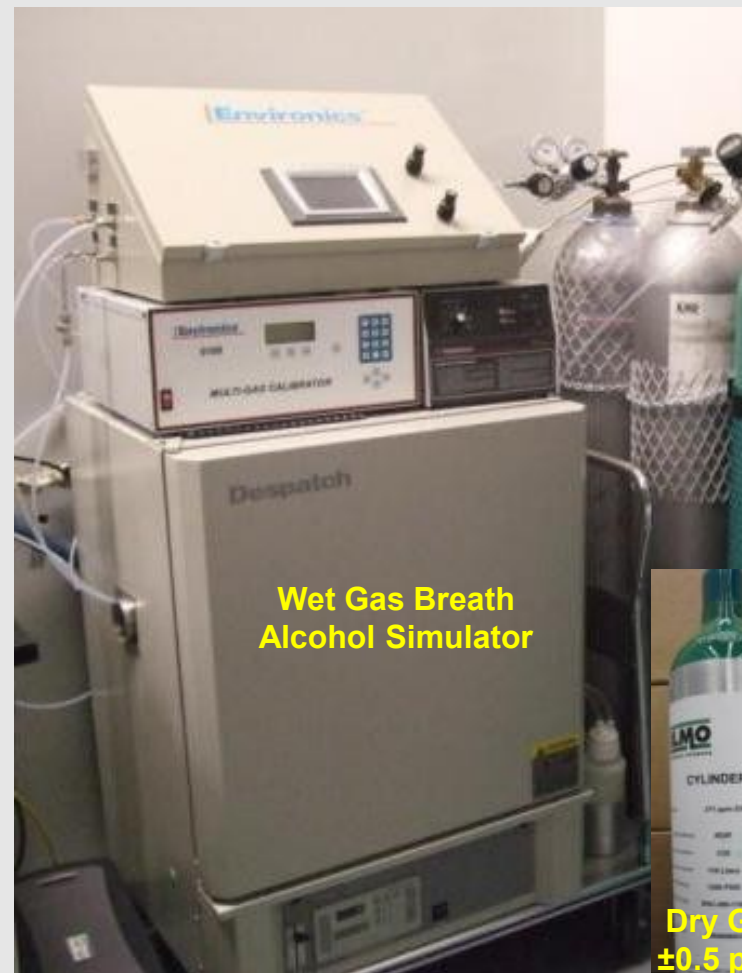
Standard Calibration Devices (SCDs)

Objective

- ◆ Assess and document the accuracy and precision of the Phase I Proof-of-Principle (PoP) prototypes

Approach

- ◆ Provide sample sources of “**breath**” or “**touch**” to PoP sensor
 - Known and consistent alcohol content



**Wet Gas Breath
Alcohol Simulator**



**Dry Gas
±0.5 ppm
(±0.0002
%BAC)**

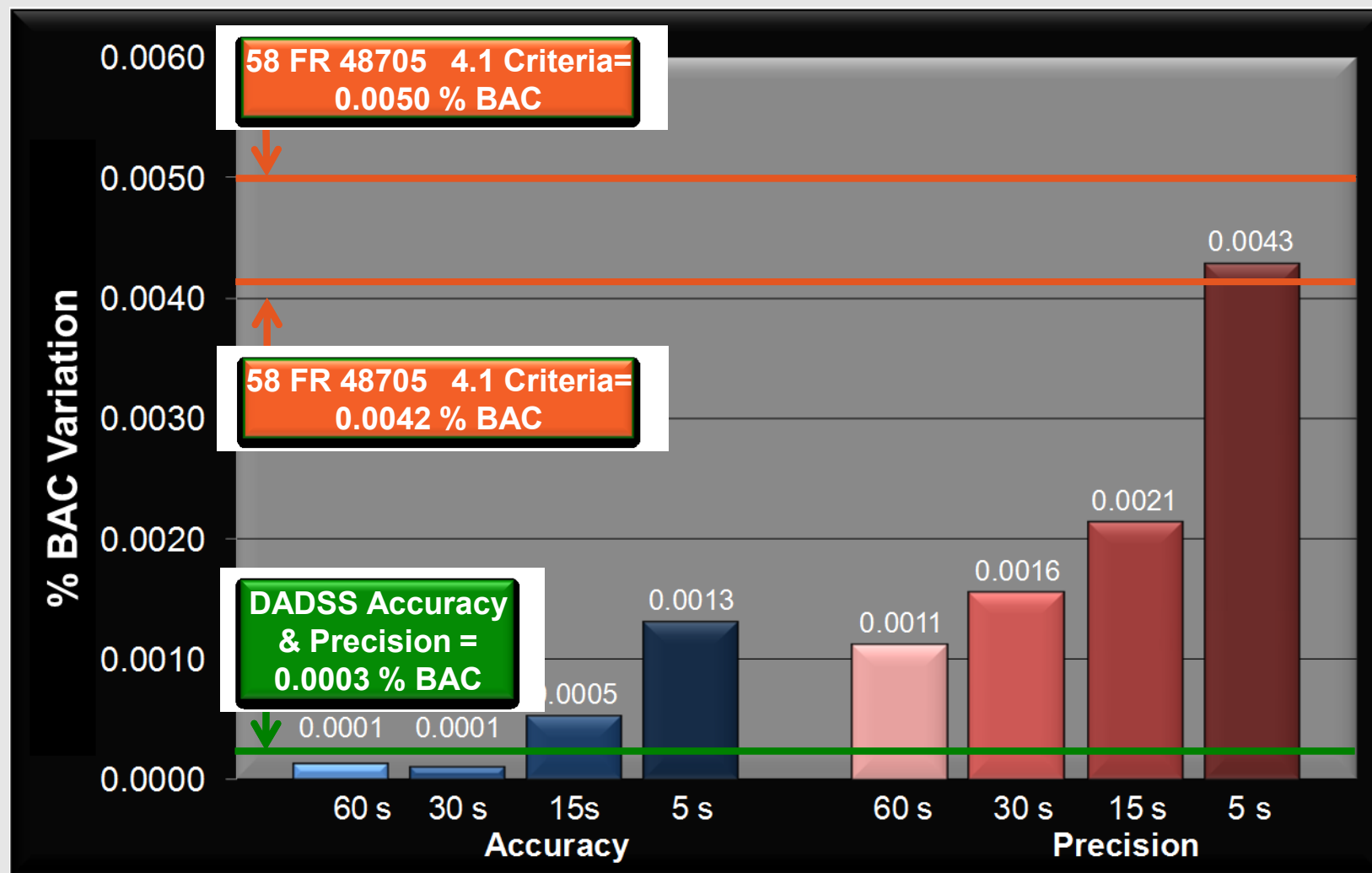


Touch-Based SCD Delivery System

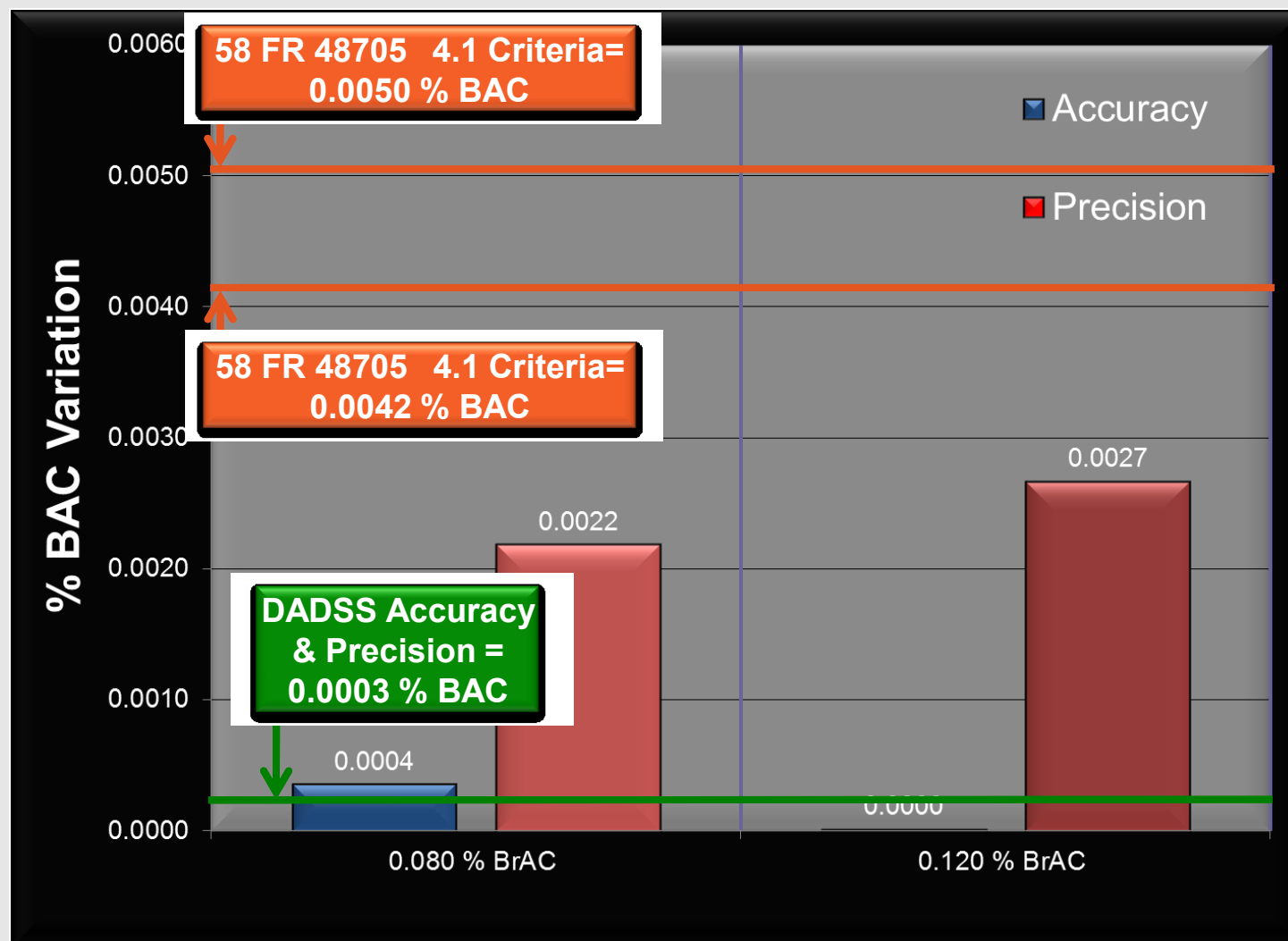


Touch-Based SCD

Takata-TruTouch Bench Test Evaluation at 0.080 % BAC

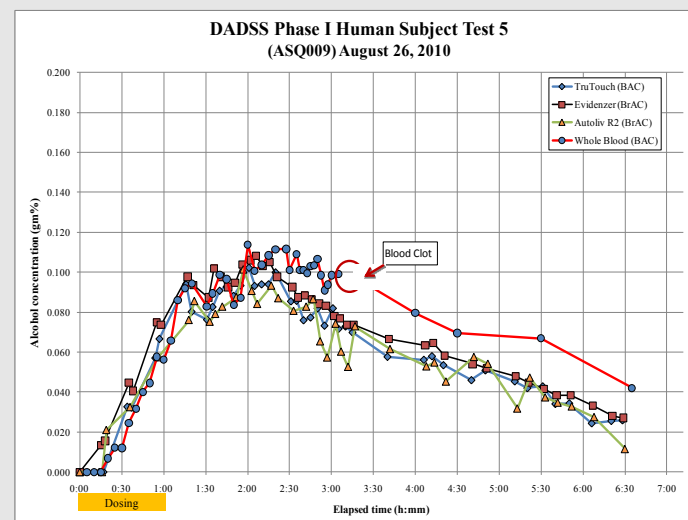
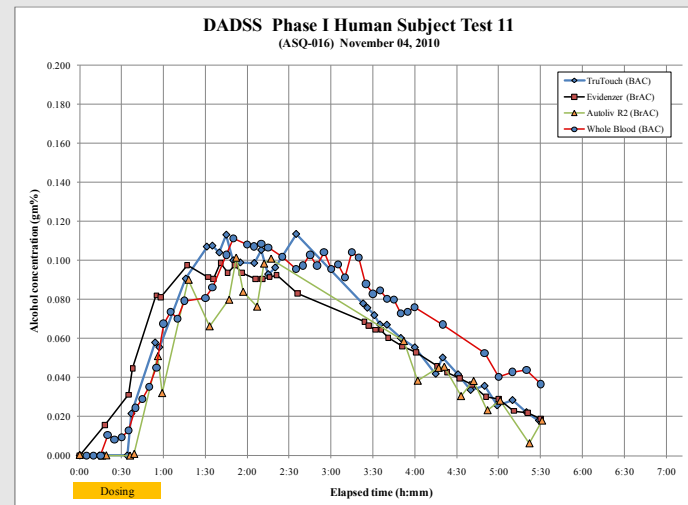


Autoliv Bench Test Evaluation



Human Subject Testing

- ◆ Subjects dosed to reach a BAC of 0.12 g/dL
- ◆ Test procedures
 - Blood is drawn at a rate of 1 ml/min
 - Samples taken every 2.5 minutes
- ◆ Every 5 minutes subjects provide
 - Breath sample into Nanopuls
 - Breath sample into Autoliv prototype
 - Presses finger on touch pad of Takata-TruTouch prototype



Summary and Next Steps

- ◆ Three DADSS Phase I PoP prototypes have completed bench and human subjects testing
- ◆ Phase I results indicate there are technologies demonstrating potential to meet DADSS Performance Specifications (meas. time, accuracy, and precision)
- ◆ Researchers have identified the research work needed to meet the DADSS requirements (gap analysis)
- ◆ Two technology providers have been selected for Phase II award:
 - Autoliv Development AB
 - Takata-TruTouch Automotive Solutions
- ◆ **Phase II research initiated**

Driver Alcohol Detection System for Safety

QUESTIONS?

<http://www.dadss.org>

Contact Information

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